IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) A method for forming a cap layer, comprising:

depositing a barrier layer in a feature in a dielectric layer of a substrate;

filling the feature with a metal-containing layer;

planarizing the substrate to create a planar surface comprising a surface of the dielectric layer and a surface of the metal-containing layer; and

depositing a refractory metal nitride cap layer on the planar surface of the substrate by a cyclical deposition process comprising alternately pulsing a metal-containing compound and a nitrogen-containing compound to deposit the refractory metal nitride cap layer.

2. (Canceled)

3. (Previously Presented) The method of claim 1, wherein the refractory metal nitride cap layer comprises tantalum nitride.

4. (Previously Presented) The method of claim 1, wherein the pulsing is continued until the refractory metal nitride cap layer has a crystalline like structure over the metal-containing layer.

5. (Previously Presented) The method of claim 1, wherein the pulsing occurs at a pressure between about 0.5 Torr and about 5 Torr at a temperature between about 150°C and about 350°C.

6. (Previously Presented) The method of claim 1, wherein the pulsing is repeated until the refractory metal nitride cap layer has a thickness of about 10 angstroms.

7. (Previously Presented) The method of claim 1, wherein the pulsing is repeated until the refractory metal nitride cap layer has a thickness of from about 5 angstroms to about 20 angstroms.

8. (Previously Presented) The method of claim 1, further comprising flowing a non-reactive gas continuously during the pulsing of the metal-containing compound and the pulsing of the nitrogen-containing compound.

9. (Previously Presented) The method of claim 1, wherein the pulsing of the metal-containing compound and the pulsing of the nitrogen-containing compound are separated by a time delay.

10. (Previously Presented) The method of claim 1, wherein the refractory metal nitride cap layer has a thickness sufficient to block diffusion of metal atoms from the metal-containing layer.

11. (Previously Presented) The method of claim 1, further comprising depositing an etch stop layer on the refractory metal nitride cap layer.

12. (Currently Amended) A method for processing a substrate, comprising:

depositing a barrier layer in a feature in a dielectric layer of a substrate;

filling the feature with a metal-containing layer;

planarizing the substrate to create a planar surface comprising a surface of the dielectric layer and a surface of the metal-containing layer;

depositing a cap layer comprising tantalum nitride on the planar surface of the substrate by a cyclical deposition process comprising alternately pulsing a tantalum-containing compound and a nitrogen-containing compound to deposit the cap layer; and

depositing an etch stop layer on the cap layer.

13. (Canceled)

14. (Previously Presented) The method of claim 12, wherein the pulsing is continued until the cap layer has a crystalline like structure over the metal-containing layer.

15. (Previously Presented) The method of claim 12, wherein the pulsing is repeated until the cap layer has a thickness of from about 5 angstroms to about 20 angstroms.

16. (Previously Presented) The method of claim 12, further comprising flowing a non-reactive gas continuously during the pulsing of the tantalum-containing compound and the pulsing of the nitrogen-containing compound.

17. (Previously Presented) The method of claim 12, wherein the pulsing of the tantalum-containing compound and the pulsing of the nitrogen-containing compound are separated by a time delay.

18. (Original) The method of claim 12, wherein the cap layer has a thickness sufficient to block diffusion of metal atoms from the metal-containing layer.

19. (Currently Amended) A method of forming a dual damascene structure, comprising:

depositing a first dielectric film on a substrate;

depositing an etch stop on the first dielectric film;

pattern etching the etch stop to define a vertical interconnect opening and expose the first dielectric film;

depositing a second dielectric film on the etch stop and the exposed first dielectric film;

pattern etching the second dielectric film to define a horizontal interconnect and continuing to etch the exposed first dielectric film to define the vertical interconnect;

depositing a barrier layer on the substrate;

depositing a metal-containing layer on the substrate to fill both the vertical interconnect and the horizontal interconnect;

planarizing the metal-containing layer and the second dielectric film;

depositing a refractory metal nitride cap layer on the planarized metal-containing layer and the planarized second dielectric film by a cyclical deposition process comprising alternately pulsing a metal-containing compound and a nitrogen-containing compound to deposit the refractory metal nitride cap layer; and

depositing an etch stop layer on the refractory metal nitride cap layer.

20. (Canceled)

21. (Previously Presented) The method of claim 19, wherein the refractory metal nitride cap layer comprises tantalum nitride.

22. (Previously Presented) The method of claim 19, wherein the pulsing is continued until the refractory metal nitride cap layer has a crystalline like structure over the metal-containing layer.

23. (Previously Presented) The method of claim 19, wherein the pulsing is repeated until the refractory metal nitride cap layer has a thickness of from about 5 angstroms to about 20 angstroms.

24. (Previously Presented) The method of claim 19, further comprising flowing a non-reactive gas continuously during the pulsing of the metal-containing compound and the pulsing of the nitrogen-containing compound.

25. (Previously Presented) The method of claim 19, wherein the pulsing of the metal-containing compound and the pulsing of nitrogen-containing compound are separated by a time delay.

26. (Previously Presented) The method of claim 19, wherein the refractory

metal nitride cap layer has a thickness sufficient to block diffusion of metal atoms from the metal-containing layer.